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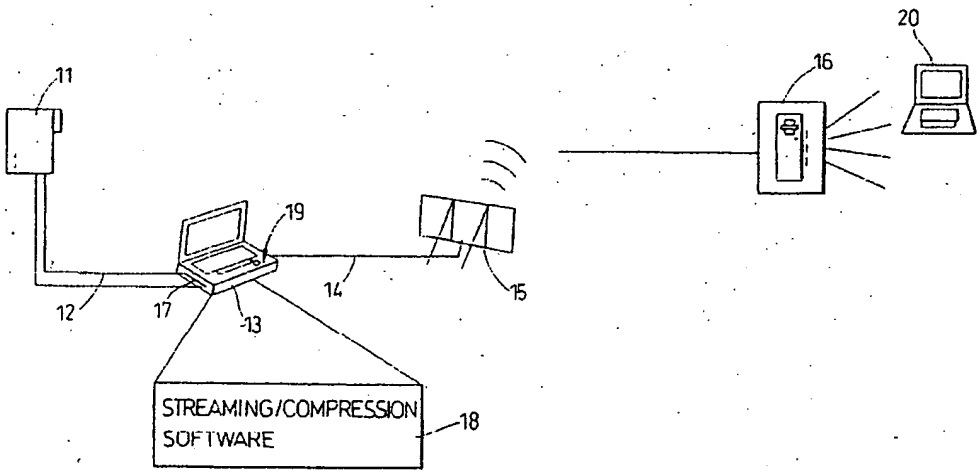
For two letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: TRANSMITTING VIDEO DATA OVER A COMMUNICATIONS NETWORK



(57) Abstract: Analogue video and audio signals are produced (12) by a video camera (11). The signals are converted into digital data by a laptop computer (13) which is used to produce a data stream (14). The data stream is transmitted via an ISDN modem and a portable satellite communication device (15) to a remote streaming server (16). The streaming server can transmit the data stream to a plurality of receivers over the Internet, thereby achieving a live broadcast. The portability of the camera, laptop computer and satellite communications device means that the system can be used in remote locations virtually anywhere in the world by one person.

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Transmitting Video Data Over A Communications Network

The present invention relates to transmitting video data over a communications network, and additionally, although not essentially, to transmitting audio data.

Known systems for transmitting live video and audio signals for broadcast require cumbersome and expensive equipment. The size of the equipment and the potential financial loss if the equipment is damaged means that producers are reluctant to take the equipment to remote and potentially dangerous locations and so many events which would be of interest to viewers are unable to be broadcast.

The existing equipment also requires a team of people to film and transmit the images and sound, which adds to the overall cost of producing a broadcast.

Previous attempts to produce live broadcasts using more portable and less costly equipment have been unsuccessful due to the difficulty of producing images of adequate quality and frame rate for broadcast.

An object of the present invention is to provide a system which is portable and relatively cheap but capable of transmitting video data of acceptable image quality and frame rate. Embodiments of the present invention are intended to be portable, easy to set up and use so can essentially be regarded as a one person kit.

According to a first aspect of the present invention there is provided a system for transmitting video data over a communications network, the system including:

apparatus for supplying an analogue video signal;

a conversion component for converting the analogue video signal into digital video data;

a streaming component for producing a data stream using the digital video data, and

a transmitting component for transmitting the stream over the communications network.

In this Specification "video data" refers to image data in general.

Preferably, the transmitted stream is received by a broadcasting component for transmitting the stream data to one or more receivers over the communications network.

It is also preferred that the system further includes an identifier component for transferring data identifying the broadcasting means. The identifying data may include an Internet Protocol (IP) address and the broadcasting component can include a server associated with the IP address. The identifying data is preferably transferred using File Transfer Protocol (FTP) means.

The streaming component preferably includes portable satellite communication apparatus. The portable satellite communication apparatus may include Nera World Communicator (also branded "BTSatelan") and/or Glocom Gemini-128 Communicator.

The streaming component may further include ISDN modem apparatus. The ISDN modem apparatus may include a Psion Dacom Gold Card ISDN modem.

The conversion component may include a video adapter with analogue to digital conversion capabilities, such as a USB Adapter.

The streaming component means may include a portable computer, preferably a laptop model and additionally or alternatively may include a data compression component. The data stream produced is preferably usable with QuickTime™ or RealNetworks™ software. In a preferred embodiment the portable computer executes Sorenson Broadcaster™ software or RealProducer™ Plus 8 software.

The analogue video signal apparatus may be a video camera.

Audio signal data may also be produced, converted and transmitted with the video data.

According to a second aspect of the present invention there is provided a method of transmitting video data over a communications network, the method including steps of:

supplying an analogue video signal;

converting the analogue video signal into digital video data;

producing a data stream using the digital video data, and

transmitting the stream over the communications network.

Whilst the invention has been described above, it extends to any inventive combination of the features set out above or in the following description.

The invention may be performed in various ways, and, by way of example only, an embodiment thereof will now be described by way of example only, reference being made to the accompanying drawing, in which:-

Figure 1 illustrates schematically a system according to a preferred embodiment.

A video camera 11 is used to capture images. The camera is preferably a digital camera such as a Sony PD150, capable of producing analogue video signals as well as digital video signals. The camera also includes a microphone and is capable of producing audio signals. The camera is fitted with conventional video and audio leads for transferring the analogue video and audio signals to a portable laptop computer 12, preferably an Apple Macintosh G4 Titanium PowerBook. At the time of writing, the Applicant considers the G4 Titanium PowerBook to be the most powerful and suitable portable computer available in the marketplace, although a less powerful machine such as a G3 PowerBook could be used. The camera and computer can be powered by rechargeable batteries. To increase the portability of the hardware further, solar power battery packs have been developed by the Applicant. Rechargeable batteries required to generate the correct voltage were soldered together and cables and connectors were attached

so that they could work with solar panel connectors. All connectors from the laptops, camera and satellite equipment could take power from the battery pack and/or the solar panel. Resistors were used to regulate the voltage for each particular piece of equipment.

The laptop computer 13 is fitted with a video adapter (shown schematically as 17), preferably an Interex XLR8 Interview ™ USB video adapter, into which the video lead is plugged. The audio leads are connected via a mini-jack adapter to the MIC socket of the computer 13. The USB video adapter 17 includes circuitry for converting the analogue video and audio input into digital video and audio data which can be used by the laptop computer 13.

Initial experiments involving supplying a digital video signal from the camera into the computer were unsuccessful as insufficient bandwidth meant that an acceptable frame rate could not be achieved. Surprisingly, supplying an analogue video signal which is converted by the video adapter 17 into digital video data means that images of acceptable quality and frame rate can be processed by the computer and transmitted over the communications network to other receivers.

The laptop computer 13 executes "Sorenson Broadcaster" ™ software 18 produced by Sorenson Vision Inc. or "RealProducer™ Plus 8" software produced by RealNetworks™ Inc. The Sorenson software is a live video and audio broadcasting tool created for use with Apple

Computers' QuickTime™ (version 4.1 or higher). The RealNetworks ™ software is a live video and audio broadcasting tool created for use with RealPlayer G2 or later. The software 18 is capable of compressing video and/or audio data and configuring it for live streaming on a variety of networks, including the Internet. The streams produced by Sorenson Broadcaster can be played on Macintosh or Windows based computers using QuickTime™ (version 4.1 or higher). The streams produced on RealProducer ™ Plus 8 can be viewed on Macintosh or Windows based computers using RealPlayer G2 or later.

The main window of the Sorenson Broadcaster ™ or RealProducer ™ Plus 8 software displayed on the screen of the computer should preview the output of the video camera and monitor the microphone of the camera.

The "Sources" menu of the Sorenson software or the "Options" menu of RealProducer Plus 8 is used to set audio and video inputs as follows:

Audio source: Device: built-in, Input: sound in

Video source: Digitiser: built-in, Input: composite, Format: PAL

The Sorenson Broadcaster ™ and RealPlayer ™ Plus software connect to the Internet when executed. The Internet settings of the laptop 13 are set as follows:

TCP/IP settings should read:

Connect via: PPP

Configure: Using PPP Server

Name server addr.: 194.72.6.57 & 194.73.82.242

Additional search Domains:

Remote Access settings should read as follows (it will be understood that these details are normally specific to the Internet Service Provider being used and could vary):

Name: form

Password: *(hidden)*

"Save password" checked

Number: 00 44 845 757 6333 (possibly followed by a # if the Nera World Communicator is being used)

"Connect" button will start dial up.

Modem settings:

Connect via: Gold Card ISDN

Modem: Psion Dacom Gold Card ISDN

Sound:On

Dialling: Tone

Ignore dial tone (unchecked)

Should the computer 13 be unable to connect, then a terminal set up tool, such as "Z-term", currently available from www.shareware.com, by conducting a search for "zterm", can be used to configure the laptop (using the string "AT<%A2=95&WZ" when using the Nera World Communicator, or "AT<%A2=96&WZ" when using the Glocom Gemini-128 Communicator). This configures ISDN card to dual ISDN when using the Glocom Communicator.

The parameters in the "Settings" menus of the Sorenson Broadcaster software are set as follows:

Settings/Quality/

Audio: Compression...

Compressor: Qualcom Purevoice

Options: Qualcom half rate for streaming when using the Nera World Communicator, or PureVoice ™ SmartRate ™ when using the Glocom Communicator,

Optimise compression for streaming checked

Video: Compression...

Compressor: H263

Depth: color

Quality: medium

Frames per second: 6, when using Nera World Communicator or 12.5 when using Glocom Gemini-128 Communicator

Keyframe every 30 frames

Limit data rate to 4.5 K/s when using Nera World Communicator or 9 K/s when using Glocom Gemini-128 Communicator.

Compressor...Options: both unchecked when using Nera World Communicator, Cycle Intra Macroblocks checked when using Glocom Gemini-128 Communicator

Size: 240 x 180

Packetizers:

RTP Payload Encoding: H263

Packet Size Limit (bytes): 1460

Packet Duration (ms): (blank)

Settings/Network/

Broadcast type: Unicast

Receiver's IP address: corresponds to the IP address for the Streaming Server, e.g. Globix.

Broadcast Audio and Video Ports: will vary according to TCP/IP connections

Buffer Delay: 4

Settings/Recording/

Save to file (checked)

The parameters in the "Recording Assistance" windows of the RealProducer ™ Plus 8 software are set as follows:

Page 1: Select "Live Broadcast"

Page 2: Input Source (check both audio and video)

Video Dimensions Width: 240 Height: 180

Page 3: RealMedia Click Information: Relevant title and copyright information inputted

Page 4: File Type: Single Rate

Page 5: Target Audience: Click ISDN when using Nera World Communicator or Dual-ISDN when using Glocom Gemini-128 Communicator

Page 6: Audio Format: Voice only

Page 7: Video Quality: Smoothest Motion Video

Page 8: Media Server: corresponds to RealSystems Server 8 settings, e.g. provided by Globix

The parameters given above are the optimum settings when using Sorenson Broadcaster ™ or RealProducer ™ Plus 8 with either the Nera World Communicator or Glocom Gemini-128 Communicator. It will be understood by those skilled in the art of streaming video compressions that corresponding settings can be configured as new hardware and software becomes available which allows these rates to increase.

The portable computer 13 is also fitted with an ISDN PCMCIA modem card (shown schematically as 19), preferably Psion Dacom Gold, which is capable of transferring data at up to 128 kilobits per second at the dual ISDN standard. The ISDN card 19 is connected via a line 14 to a portable satellite communications device 15, either the Nera World Communicator or Glocom Gemini-128 Communicator. The Nera World Communicator is lightweight and compact and can transmit data at 64 kbps at a variable rate Internet protocol service for virtually global Internet communication using satellites.

The Glocom Gemini-128 Communicator is lightweight and compact and can transmit data at 128 kbps as a variable rate Internet protocol service for virtually global Internet communication using satellites.

When using Sorenson Broadcaster ™, the following additional stage is necessary. This stage is not necessary when using RealProducer ™ Plus 8, since it is catered for in Page 8 of the "Recording Assistance" settings. When the

user is ready to broadcast the images and sound captured by the camera 11, the "Announce" icon on the Sorenson Broadcaster software is selected. A text file including the Internet protocol address of the streaming server is transferred to a remote streaming server 16 using File Transfer Protocol software, such as the "Fetch" tool, currently available, for example, from http://fetchsoftworks.com. The remote streaming server 16 preferably includes Mac OSX Server version 3 for replicating streams produced using the Sorenson Broadcaster software or RealSystems Server 8 for replicating streams produced in RealProducer™ Plus 8 to a plurality of other remote computers such as PC 20, via Worldwide Web pages.

When the transfer is complete, the record button on camera 11 is pressed (to record the captured images/sound to tape) and the "Broadcast" button in Sorenson Broadcaster™ 10, or the "Start" button in RealProducer ™ Plus 8 is selected and the images and sound captured by the camera 11 will then be transferred as analogue video and audio signals over cables 12 and converted into digital data by the video adapter of the portable computer 13. The software executing on the computer 13 will then produce a QuickTime™ (when using Sorenson Broadcaster ™) or RealPlayer ™ (when using RealProducer ™ Plus 8) data stream which is transmitted over the ISDN line 14 to the Nera World Communicator or Glocom Gemini-128 Communicator

15. A video window on the screen of the laptop 13 should display compressed broadcast images and the black buffer window should display ongoing audio and video data rates. The data is transmitted via the Nera World Communicator or Glocom Gemini-128 Communicator 15 to the remote streaming server 16 which transfers copies of the data stream to other computers 20 configured to connect to its web page and receive the images.

The novel use of the combination of hardware components and software means that images and sound of reasonable quality can effectively be broadcast to a plurality of receiving terminals connected to the Internet anywhere in the world at a frame rate of between 6 and 12.5 frames per second. The higher frame rate can be achieved by using the Glocom Gemini-128 Communicator which allows the higher data transfer dual ISDN to be used. The portability of the hardware means that it used in remote and extreme/dangerous locations and can be operated by a one person.

Claims

1. A system for transmitting video data over a communications network, the system including:

apparatus for supplying an analogue video signal;

a conversion component for converting the analogue video signal into digital video data;

a streaming component for producing a data stream using the digital video data, and

a transmitting component for transmitting the stream over the communications network.

2. A system according to Claim 1, wherein the transmitted stream is received by a broadcasting component for transmitting the data stream to one or more receivers over the communications network.

3. A system according to Claim 2, wherein the system transfers data identifying the broadcasting means.

4. A system according to Claim 3, wherein the identifying data includes an Internet Protocol (IP) address and the broadcasting component includes a server associated with the IP address.

5. A system according to Claim 4, wherein the identifying data is transferred using file transfer protocol (FTP).

6. A system according to any one of the preceding Claims, wherein the streaming component includes portable satellite communication apparatus.

7. A system according to Claim 6, wherein the portable satellite communication apparatus includes Nera World Communicator or Glocom Gemini-128 Communicator.

8. A system according to any one of the preceding Claims, wherein the streaming component includes ISDN modem apparatus.

9. A system according to Claim 8, wherein the ISDN modem includes a Psion Dacom Gold Card modem.

10. A system according to any one of the preceding Claims, wherein the conversion component includes a video adapter with analogue to digital conversion capabilities.

11. A system according to Claim 10, wherein the video adapter includes a USB video adapter.

12. A system according to any one of the preceding Claims, wherein the streaming component includes a laptop computer.

13. A system according to any one of the preceding Claims, wherein the streaming means includes a data compression component.

14. A system according to Claim 13, wherein the data stream produced is usable with QuickTime™ or RealNetworks™ software.

15. A system according to Claim 13 or 14, wherein the streaming component includes Sorenson Broadcaster ™ or RealProducer™ Plus 8 software.

16. A system according to any one of the preceding Claims wherein the analogue video signal includes a video camera.

17. A system according to any of the preceding Claims, wherein audio data is supplied with the analogue video signal;

the conversion component includes means for converting the audio signal into digital audio data, and

the data stream produced by the streaming component includes the digital audio data.

18. A method of transmitting video data over a communications network, the method including steps of:

supplying an analogue video signal;

converting the analogue video signal into digital video data;

producing a data stream using the digital video data, and

transmitting the stream over the communications network.

19. A method according to Claim 18, further including steps of:

supplying an audio signal, and

converting the audio signal into digital audio data,

wherein the data stream produced and transmitted includes the digital audio data.

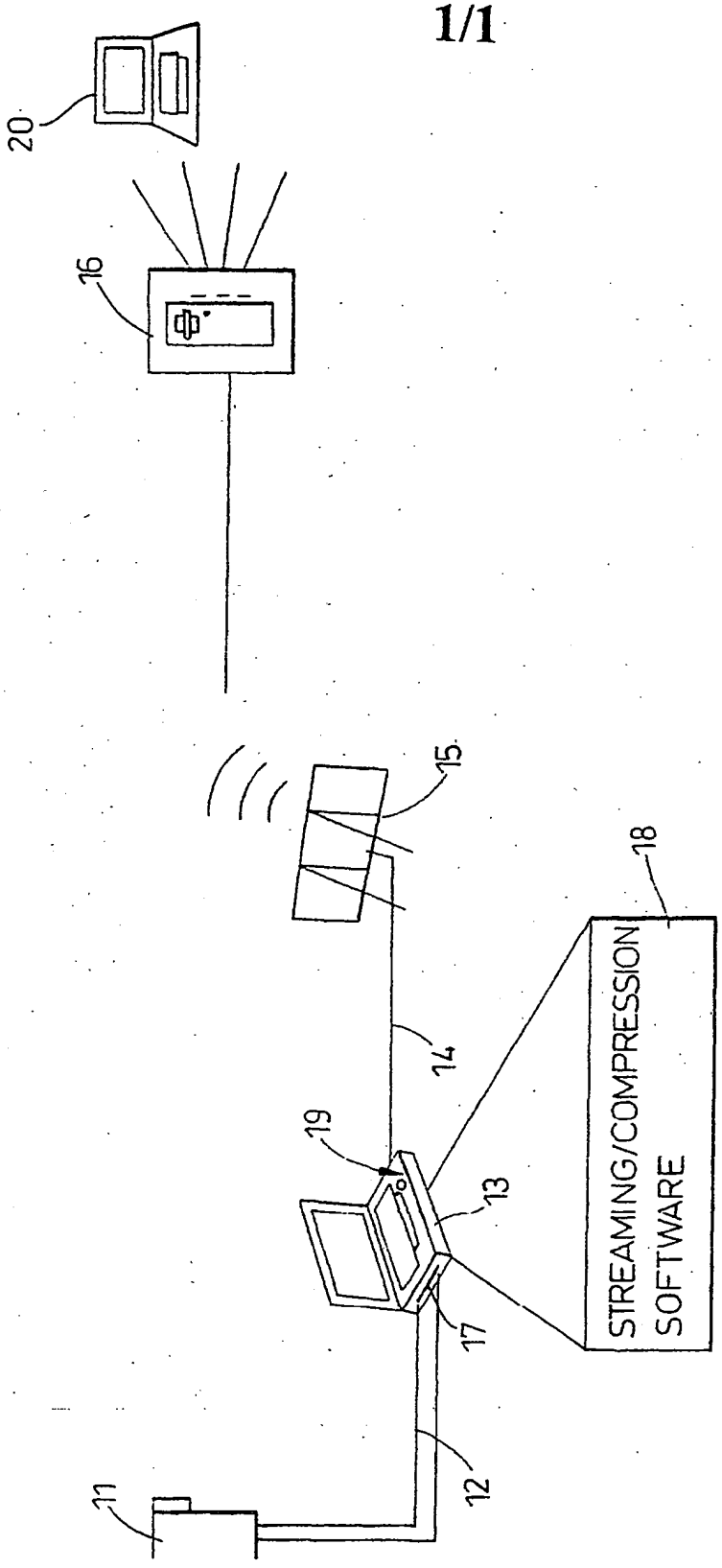

Fig. 1

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 01/01192

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04N7/18

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, PAJ, INSPEC, IBM-TDB

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 99 12349 A (DISCOVERY COMMUNICAT INC) 11 March 1999 (1999-03-11) page 6, line 8 -page 8, line 2 page 10, line 1 -page 13, line 21 page 15, line 15 -page 16, line 16 page 21, line 5 -page 27, line 11; figures 3A,8B ---	1-19
X	WO 98 51080 A (ACOSTA EDWARD ;KAO FRANK (US)) 12 November 1998 (1998-11-12) page 1, line 5 -page 3, line 14 page 6, line 5 -page 14, line 5 page 38, line 8 -page 41, line 5; figures 1,2,6 --- -/--	1-5,10, 12,13, 16,18

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
22 June 2001	10/07/2001

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Guettlich, J

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 01/01192

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 986 259 A (MATSUSHITA ELECTRIC IND CO LTD) 15 March 2000 (2000-03-15) the whole document	1-5, 8-10,13, 16-19
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INTERNATIONAL SEARCH REPORT

...ormation on patent family members

Inte...ional Application No
PCT/GB 01/01192

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